



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/743,573	12/22/2003	Bo-Yeoun Jo	20067/OPP031368US	7992
34431	7590	12/16/2005	EXAMINER	
HANLEY, FLIGHT & ZIMMERMAN, LLC 20 N. WACKER DRIVE SUITE 4220 CHICAGO, IL 60606			WILSON, CHRISTIAN D	
			ART UNIT	PAPER NUMBER
			2891	

DATE MAILED: 12/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

10/743,573

Applicant(s)

JO, BO-YEOUN

Examiner

Christian Wilson

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

1. The translation of the foreign priority papers submitted on September 19, 2005 have been made of record and overcome the previous rejection of claims 1 – 20 under Maejima et al..

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 – 4 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Maejima et al.

Maejima et al. (US 6,891,218) discloses a method of fabricating a capacitor with a first metal layer 2, a dielectric layer 3, and a second metal layer 4 comprising the steps of etching the second metal layer and the dielectric layer in order [Figures 3C & 3E], and changing the etching conditions associated with the second metal layer prior to etching the dielectric layer [column 10, lines 45-65].

Regarding claim 2, Maejima et al. further discloses using an RIE process [abstract].

Regarding claims 3 and 4, Maejima et al. further discloses following the etching that the dielectric layer remains with an even surface [Figure 3F].

Art Unit: 2891

Regarding claim 19, Maejima *et al.* further discloses a photoresist pattern 5 used as an etching mask.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 5 and 12 – 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maejima *et al.* in view of Hwang.

Maejima *et al.* teaches a fluorine etching gas for the metal layer and a chlorine etching gas for the dielectric layer [column 9, lines 25-40], but does not discuss the particular etch chemistries and etch parameters. Hwang (US 2003/0064590) teaches etching gases of Cl₂, CHF₃, and Ar for metal and Cl₂ and Ar for dielectric layers and the claimed etch gas ratios and RIE plasma etch parameters [0100, Table VI, 0132]. It would have been obvious to one of ordinary skill in the art to use the etching gases and etch parameters of Hwang in the method of Maejima *et al.* since Hwang teaches that these parameters provide a clean etch profile without the need for vigorous post etch cleaning and where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

6. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maejima *et al.* in view of Ouellet *et al.*

Art Unit: 2891

Maejima *et al.* teaches a metal layer formed of a platinum/titanium (Pt/Ti) layer and a titanium/titanium nitride (Ti/TiN) interconnection metal layer, but does not discuss forming a second metal layer in the capacitor with a Ti/TiN layer with the claimed thicknesses. Ouellet *et al.* (US 6,083,805) teaches a capacitor metal layer formed of a Ti/TiN with a thickness of 1000 Å [column 3, lines 20-30]. It would have been obvious to one of ordinary skill in the art to use the dual metal layers of Ouellet *et al.* in the method of Maejima *et al.* since Ouellet *et al.* teaches that Ti/TiN layers provide reduced stress in the capacitor electrode, and where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

7. Claims 8 – 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maejima *et al.* in view of Allman *et al.*

Maejima *et al.* teaches a metal layer but does not discuss the particular thicknesses of these layers. Allman *et al.* teaches a metal layer with a thickness of 1,600 Å [0022, 0025] and a dielectric of nitride with a thickness of 450 Å [0025]. It would have been obvious to one of ordinary skill in the art to use the thicknesses and dielectric of Allman *et al.* in the method of Maejima *et al.* since Allman *et al.* teaches that these thicknesses provide protection for lower layers during plasma etching and silicon nitride provides improved dielectric properties.

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maejima *et al.* in view of Tee *et al.*

Maejima *et al.* teaches a stacked metal layer, but does not discuss a Ti/TiN/AlCu/Ti/TiN metal layer. Tee *et al.* (US 2002/0052077) teaches a Ti/TiN/AlCu/Ti/TiN metal layer for a

Art Unit: 2891

capacitor [0031]. It would have been obvious to one of ordinary skill in the art to use the stacked metal layer of Tee *et al.* in the method of Maejima *et al.* since this layer prevents reaction with the underlying substrate.

9. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maejima *et al.* in view of Subramanian *et al.*

Maejima *et al.* teaches a photoresist layer but does not discuss the photoresist thickness. Subramanian *et al.* (US 5,494,837) teaches a photoresist with a thickness of 10,000 Å [column 4, line 52]. It would have been obvious to one of ordinary skill in the art to use a thickness of 11,000 to 15,000 Å in the method of Maejima *et al.* since Subramanian *et al.* teaches that a similar thickness is well known in the art for RIE methods and where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Conclusion

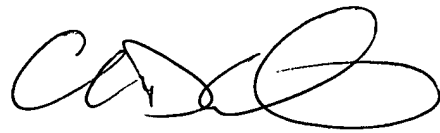
10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian Wilson whose telephone number is (571) 272-1886.

The examiner can normally be reached on weekdays, 7:30 AM to 4 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2891

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'CW', with a large, stylized loop at the end.

Christian Wilson, Ph.D.
Primary Examiner
Art Unit 2891

CDW